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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/664,875	09/22/2003	Naoteru Matsubara	65933-044	4231

7590 09/13/2007  
McDERMOTT, WILL & EMERY  
600 13th Street, N.W.  
Washington, DC 20005-3096

EXAMINER

IM, JUNGHWA M

ART UNIT	PAPER NUMBER
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2811

MAIL DATE	DELIVERY MODE
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09/13/2007

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

## Office Action Summary

**Application No.**

10/664,875

**Applicant(s)**

MATSUBARA ET AL.

**Examiner**

Junghwa M. Im

**Art Unit**

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 18 June 2007.  
2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.  
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-5 and 18-22 is/are pending in the application.  
4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.  
5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.  
6) ☒ Claim(s) 1-5 and 18-22 is/are rejected.  
7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.  
8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.  
10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☒ All b) ☐ Some \* c) ☐ None of:  
1. ☒ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)  
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)  
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.  
4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_.  
5) ☐ Notice of Informal Patent Application (PTO-152)  
6) ☐ Other: \_\_\_\_\_.

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-5 and 18-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gates et al. (US Pat. 6,603,204), hereinafter Gates in view of Watanabe et al. (US Pat. Pub. 2002/0008323), hereinafter Watanabe.

Regarding claims 1 and 18, Fig. 8 of Gates shows a semiconductor device comprising:  
a semiconductor substrate [50];  
a multilayered film including a first dielectric film [54'], an etching stopper [56'] and a second dielectric film [58'] stacked on said semiconductor substrate in this order; and  
a via plug [a narrow portion of the metal layer 74 in the layer 54'] and a metal interconnect [a wide portion of the metal layer 74 in the layer 58'], which is formed on the via plug, formed in said multilayered film, wherein

the dielectric constant [k] of said etching stopper is larger than that of said first and second dielectric films (k=1.4-3.5 for the first and second dielectric films, k=1.1-5.5 for etching stopper; col. 4, lines 9-64).

Fig. 8 of Gates shows most aspects of the instant invention except "the upper surface of said etching stopper is located under the upper surface level of said metal interconnect, the under

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surface of said etching stopper is located over the under surface level of said metal interconnect, and the under surface of said metal interconnect is located inside the first dielectric film,” and “the etching stopper is positioned substantially below the middle level in the height of said metal interconnect.” Figure 10 of Watanabe shows a metal interconnect [30] wherein the upper surface of the etching stopper [24] is located under the upper surface level of said metal interconnect, the under surface of said etching stopper is located over the under surface level of said metal interconnect, and the under surface of said metal interconnect is located inside the first dielectric film [23] and the etching stopper is positioned substantially below the middle level in the height of said metal interconnect.

It would have been obvious to one of ordinary skill in the art at the time of the invention was made to incorporate the teachings of Watanabe into the device of Gates in order to have the upper surface of the etching stopper located under the upper surface level of said metal interconnect, the under surface of the etching stopper located over the under surface level of the metal interconnect, and the under surface of the metal interconnect located inside the first dielectric film while the etching stopper is positioned substantially below the middle level in the height of said metal interconnect to reduce a problem caused by residual masking material.

Regarding claims 2 and 19, Gates discloses the semiconductor device wherein the dielectric constant [ $k=1.1-5.5$ ] of said etching stopper is less than or equal to 5 (col. 4, lines 60-64).

Regarding claims 3, 4, 20 and 21, Gates discloses the semiconductor device wherein the

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dielectric constant of said etching stopper is larger than or equal to a summation of 2 and the dielectric constant of either one of the dielectric constants [ $k=1.4-3.5$ ] of said first and second dielectric films (col. 4, lines 15-20).

Regarding claims 5 and 22, Gates discloses said metal interconnect includes copper as a constituting element (col. 7, lines 30-35).

### ***Response to Arguments***

Applicant's arguments with respect to pending claims have been considered but are moot in view of the new ground(s) of rejection.

### ***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a).

Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

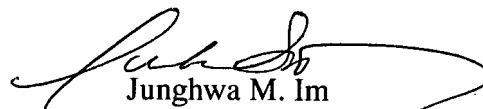
A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Junghwa M. Im whose telephone number is (571) 272-1655. The examiner can normally be reached on MON.-FRI. 8:30AM-5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richard T. Elms can be reached on (571) 272-1869. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

  
Junghwa M. Im  
Examiner  
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jmi  
8/30/2007

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